

DS 687: Data Science Capstone
School of Technology & Computing

3 Credits, Graduate Course
Effective Date: Fall 2022

Access to the Internet is required.

All written assignments must be in Microsoft-Word-compatible formats.

See the library's APA Style Guide tutorial for a list of resources that can help you use APA style.

Faculty Information

Professional experience information for instructors can be found under Content à Syllabus, Schedule, and Course Team à Meet Your Instructor in the online course menu.

Contact Information

Contact information for instructors can be found in the online course menu. Additional contact information regarding the TA for the course, the Program Manager, Program Director and Dean is also shared in the same location. Hyperlinks on the contact page direct students to the responsible party's weekly office hours.

Course Description

The Data Science Capstone is the capstone course for the Master of Science in Data Science (MSDS) program. Students will demonstrate their ability to apply data science principles, tools, and techniques to a specific problem or research study, and to acquire and/or apply additional knowledge in a unique domain. This course integrates knowledge gained from previous coursework in the MSDS program.

Course Resources

Required and recommended resources to complete coursework and assignments are found on the course [Reading List](#). The reading list can be found under Course Information in Brightspace as well as from the library homepage.

Note: Required resources that must be purchased by the student are tagged “Purchase from a vendor of your choosing.” Required resources with a direct link, “Available through CityU Library”, are available at no cost to students.

Students in Canada will see required resources they need to purchase tagged “Purchase from the Canadian Bookstore.” Students outside the U.S. and Canada should contact their advisor or textbook coordinator for additional information.

Course Outcomes

As a result of this course, students will know or be able to do the following:

- Integrate a foundational knowledge of all areas of advanced data science (General Data Science Knowledge).
- Apply fundamental principles and practices of advanced data science (Data Science Principles and Practices)
- Apply critical and ethical thinking to solve problems in advanced data science (Critical and Ethical Thinking).

- Evaluate data to inform decisions and solve problems in advanced data science (Quantitative Literacy).
- Create the ability to develop and express ideas while applying a variety of delivery models, genres, and styles (Communication).
- Collaborate effectively on diverse teams to accomplish a common goal (Collaboration).

Additional Information

Topics covered:

1. Problem Identification, Topic Selection, & Presentation
 - Understand a capstone project management methodology – Scrum.
 - Propose a problem and its potential solutions to be developed over the remainder of the course.
2. Annotated Bibliography & Presentation
 - Review articles on the selected problem.
 - Analyze the reviewed articles.
3. Related Work & Presentation
 - Analyze related articles on the selected problem.
 - Compare the analyzed articles on the selected problem.
4. Starting Capstone Report & Presentation (Introduction, Background, & Related Work)
 - Design the Introduction and the Background sections.
5. Revising Capstone Report & Presentation (Approach)
 - Design the Approach section.
 - Propose the design and its implementation.
6. Revising Capstone Report & Presentation (Data Collection)
 - Apply the approach to your data collection.
 - Classify the data collection.
7. Revising Capstone Report & Presentation (Data Analysis)
 - Analyze the collected data.
8. Revising Capstone Report & Presentation, & Demo (Findings)
 - Evaluate the analyzed data.
9. Revising Capstone Report, Presentation, & Demo (Conclusions & Future Work)
 - Propose your conclusions and future work.
10. Finalizing Capstone Report, Presentation, & Demo (Abstract & Key Words)
 - Develop your abstract and keywords.

Grading Scale

The grades earned for the course will be calculated using City University of Seattle's decimal grading system, found in the current University Catalog (<https://www.cityu.edu/catalog/>).

Grading rubrics with details on how each assignment will be graded are located under *Grades* from the main bar in the online course menu. Students should review the rubric for each assignment prior to completing their work to understand how it will be assessed.

OVERVIEW OF REQUIRED ASSIGNMENTS	% OF FINAL GRADE	POINTS
<i>Instructor Determined Assignments</i>	20%	
The Muddiest Point (MP)	5%	50 = 5 points * 10 modules
Concept Debate (CD)	5%	50 = 5 points * 10 modules
Discussion Board (DB)	10%	100 = 10 points * 10 modules
<i>Major Assignments</i>	80%	
Capstone Project (CP) Presentation	20%	200 = 20 points * 10 modules
Capstone Project (CP) Report	60%	600 = 60 points * 10 modules
TOTAL	100%	1,000 points

Course Assignments and Grading

The instructor will provide grading rubrics that will provide more detail as to how this assignment will be graded.

The Muddiest Point (MP), Concept Debate (CD), & Discussion Board (DB) – Weekly Scrum Meeting

All classes are required to use the Discussion Forum to participate in MP, CB, and DB. Participation is an integral part of this course. It is defined as active engagement in discussing the MP, CD, & DB. A student posts an answer to a weekly discussion topic on Discussion Forum. The student also posts a response to two other students' posts by the end of each module. Comments and questions should be clear and thoughtful, with correct grammar, spelling, and punctuation. The instructor will grade the quality of your discussion postings on both content and response. References and citations with APA styles for your answers are strongly recommended.

MP: Before class, students are required to submit the Muddiest Point (MP) activity. The purpose of this activity is to stimulate student engagement. The instructor uses the MP to assess how students understood the required readings. The instructor also uses the MP to customize the lecture scope to implement Just-in-Time Teaching (JiTT). The MP consists of writing a brief reflective paragraph identifying the most confusing part (i.e., the MP) of the content covered in the upcoming module. If a student understands all concepts, the student needs to explain the most exciting or interesting aspect.

Criteria	% of Grade
Participation	80%
Writing	20%
TOTAL	100%

CD: The instructor poses a problem based on the key concepts of a lecture. After reflecting on the problem, students submit their first answer with justification identifying why the answer is correct. Then, students discuss their responses with their classmates. Students discuss their thought processes and solution with peers. Students then commit to an answer and re-submit

their responses. The instructor reviews responses and thought processes with the correct answer through Weekly Announcements.

Criteria	% of Grade
Participation	50%
Writing	50%
TOTAL	100%

DB: This capstone course uses a daily scrum meeting concept called a Weekly Scrum Meeting. Each student will manage their capstone project by using Scrum. The student uses 10 sprints. Each sprint takes 1 week. Before submitting your weekly report, each student must answer the following three questions through the Weekly Scrum meeting. Have reflections on the given tasks and your approaches. Visit the tasks for next week and think of your plans in advance.

1. What have you accomplished since the last meeting?
 - Tasks accomplished.
 - Artifacts delivered.
 - What technologies used
2. What will you accomplish before the next meeting?
 - Tasks planned.
 - Artifacts to be delivered.
 - What technologies to be used
3. What obstacles are in the way? If not, what things are you very interested in?

Criteria	% of Grade
Participation	50%
Writing	50%
TOTAL	100%

Capstone

Students can select a capstone project that applies what they have learned through their degree program and demonstrates their skills for their future career plans. Students must discuss their topic selection with the instructor to check how much the topic is **S.M.A.R.T.** (Specific, Measurable, Achievable, Relevant, and Time-based).

- We recommend students use an agile methodology, Scrum.
- We require students to build their capstone project (report, presentation slide, and demo) **iteratively** and **incrementally**.
- You **must present and demo your final work** at the School of Technology & Computing (STC) Applied Research Symposium (ARS) to the public. Contact your instructor immediately for your YouTube video presentation if your schedule does not allow it.
 - For your demo, we require a link to a private YouTube video of less than 2 minutes about your application or system.
 - For your source code, we require a link to your GitHub private site, including README.md.
- We will upload the qualified final reports to [the CityU repository](#).

Capstone Project Presentation

The student will report on the research outcomes, development, or other project efforts to an academically appropriate committee in a public forum. The nature of the presentation content will determine the specific makeup of the audience. The student will choose the format of the presentation in consultation with the advisor. The layout and design must be appropriate and adequate to represent the outcomes of the effort. While students must make some form of a visual presentation, the presentation of the results may include publishing in a refereed publication, publication in a trade or popular magazine or journal, broadcast in an appropriate medium, or, in exceptional cases, limited dissemination within a closed community.

Each presenter will have 15 minutes for a presentation and 5 minutes for questions and answers. Each presenter must keep the total presentation time limit strictly.

Components	% of Grade
Structure	20%
Visual Presentation	30%
Verbal Quality & Engagement	30%
Collaboration*	20%
TOTAL	100%

*Collaboration with any reviewers including either your classmates or instructors.

Capstone Project Report

The student will provide a report formatted based on a template provided by the instructor. Students are required to improve their writing iteratively and incrementally every week. The revision will always happen during a quarter. Students will add new required sections to the existing paper every week.

Components	% of Grade
Structure	20%
Content	30%
Writing	30%
Reference	10%
Collaboration*	10%
TOTAL	100%

**Collaboration with any reviewers including either your classmates or instructors.

Course Policies

Course policies on topics such as Late Assignments, Participation, and Professional Writing are found Content → Syllabus, Schedule, and Course Team → Course Policies in the online course menu. Students are responsible for reviewing and applying these policies while enrolled in this course.

University Policies

Students are responsible for understanding and adhering to all of City University of Seattle's academic policies. The most current versions of these policies can be found in the [University Catalog](#) that is linked from the CityU Web site.

Antidiscrimination

City University of Seattle and its staff and faculty are committed to supporting our students. We value equity, diversity, and inclusion as a way of life as well as the educational opportunities it provides. City U will not tolerate any form of discrimination based on race, color, ethnicity, sexual orientation, gender identification, socioeconomic status, or religious values. If you have experienced any discrimination based on any of the above, we encourage you to report this to the University. Please report this to your instructor. If you do not feel safe reporting this to your instructor, please report to Interim Provost or to the Vice President of Student Affairs, Dr. Melissa Mecham.

Non-Discrimination & Prohibition of Sexual Misconduct

City University of Seattle adheres to all federal, state, and local civil rights laws prohibiting discrimination in employment and education. The University is committed to ensuring that the education environment is bounded by standards of mutual respect and safety and is free from discriminatory practices.

In the U.S., the University is required by Title IX of the Education Amendments of 1972 to ensure that all of its education programs and activities do not discriminate on the basis of sex/gender. Sex include sex, sex stereotypes, gender identity, gender expression, sexual orientation, and pregnancy or parenting status. Sexual harassment, sexual assault, dating and domestic violence, and stalking are forms of sex discrimination, which are prohibited under Title IX and by City University of Seattle policy. City University of Seattle also prohibits retaliation against any person opposing discrimination or participating in any discrimination investigation or complaint process internal or external to the institution. Questions regarding Title IX, including its application and/or concerns about noncompliance, should be directed to the Title IX Coordinator. For a complete copy of the policy or for more information, visit <https://www.cityu.edu/about-cityu/student-right-to-know/> or contact the Title IX Coordinator.

In Canada, in compliance with the British Columbia Human Rights Code, the Alberta Human Rights Act, WorksafeBC, and the Workers' Compensation Board of Alberta, the University believes that its environment should always be supportive and respectful of the dignity and self-esteem of individuals. Discrimination, harassment and bullying conduct, whether through person to person behaviors or via electronic communications such as email or social media is not acceptable and will not be tolerated. As an educational institution, it is our responsibility to cultivate an environment of excellence, equity, mutual respect and to recognize the value and potential of every individual. The University will take all necessary steps to meet or exceed the requirements of the law to prevent discrimination, harassment and bullying. The Respectful Workplace Policy for the prevention of discrimination, harassment and bullying policy and procedure can be found

at <https://www.cityu.edu/discover-cityu/about-cityu/> under the Policies section or at <https://www.cityuniversity.ca/about/>.

Title IX Statement

City University of Seattle and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If students have encountered any form of sexual misconduct (e.g., sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage them to report this to the University. If a student speaks with a faculty member about an incident of misconduct, that faculty member must notify CityU's Title IX coordinator and share the basic fact of the experience. The Title IX coordinator will then be available to assist students in understanding all the options and in connecting students with all possible resources on and off campus.

To view CityU's sexual misconduct policy and for resources, please visit the [Title IX](#) and [Campus Safety](#) pages in the my.cityu.edu portal.

Religious Accommodations

Washington state law requires that City University of Seattle develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The University's policy, including more information about how to request an accommodation, is available in the University Catalog. Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request Form found on the student dashboard in the my.cityu.edu student portal.

Academic Integrity

Academic integrity in students requires the pursuit of scholarly activity that is free from fraud, deception and unauthorized collaboration with other individuals. Students are responsible for understanding CityU's policy on academic integrity and adhering to its standards in meeting all course requirements. A complete copy of this policy can be found in the [University Catalog](#) under *Student Rights and Responsibilities* on the page titled *Academic Integrity Policy*.

Attendance

Students taking courses in any format at the University are expected to be diligent in their studies and to attend class regularly.

Regular class attendance is important in achieving learning outcomes in the course and may be a valid consideration in determining the final grade. For classes where a physical presence is required, a student has attended if they are present at any time during the class session. For online classes, a student has attended if they have posted or submitted an assignment. A complete copy of this policy can be in the [University Catalog](#) under *Student Rights and Responsibilities* on the page titled *Attendance*.

Final Assignments Due Date

Final assignments for each class at CityU must be due on or before the final date of the course as indicated in the university's course information system. Due dates that extend beyond the final date of the course may negatively impact tuition funding for students.

Support Services

Disability Services Accommodations Statement

Students with a documented disability who wish to request academic accommodations are encouraged to contact Disability Support Services to discuss accommodation requests and eligibility requirements. Please contact Disability Support Services at disability@cityu.edu or 206.239.4752 or visit the [Disability Support Services](#) page in the my.cityu.edu portal. Confidentiality will be observed in all inquiries. Once approved, information about academic accommodations will be shared with course instructors.

Library Services

CityU librarians are available to help students find the resources and information they need to succeed in this course. Contact a CityU librarian through the [Ask a Librarian service](#), or access [library resources and services online](#), 24 hours a day, seven days a week.

Online Tutoring

CityU students have access to free online tutoring offered through Brainfuse, including writing support, from certified tutors 24 hours a day, seven days a week. Visit the [Brainfuse](#) page on the my.cityu.edu portal for more information.